MORPHO-AGRONOMICAL CHARACTERIZATION OF DOMESTICATED COMMON BEAN CORE COLLECTION FROM MÉXICO

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INTRODUCTION. Characterization deficiencies are the major challenge for systematic use of common bean (*Phaseolus vulgaris* L.) diversity in genetic breeding programs. Due to complications observed for detailed crop evaluations in huge number of accessions it is necessary to create representative and manageable core collections. Core collections are small, but thoroughly representative samples which facilitated diversity characterization in several crops. There are 7,846 accessions at INIFAP's (Instituto Nacional de Investigaciones Forestales, Agrícolas y Pecuarias; National Institute for Forestry, Agriculture and Livestock Research) common bean germplasm bank. A subset consisting in 200 accessions were selected to represent the gene bank's entire common bean holdings. Selection was made considering seed color and germplasm origin, representing regions where bean domestication could have been carried out such as the borders of states of Guanajuato, Jalisco and Michoacan (Payró-de la Cruz *et al.*, 2005). Other regions where common bean was traditionally planted or recently introduced were also considered. Evaluating the core collection for a wide range of traits such as morphological, agronomic and disease resistance could be used to identify parents which can be incorporated into breeding programs. Objectives were to characterize using morpho-agronomical traits and to evaluate the representative degree included in a subset of 200 accessions selected as a core collection in INIFAP's common bean germplasm bank.

MATERIALS AND METHODS. Two hundred accessions from INIFAP's common bean core collection were characterized in 2003. Accessions were planted in May 19th at Santa Lucía de Prías, México in one 3 m row, 0.8 m apart and three replications. An additional empty row was leaved between accessions to facilitate the growth of Type IV vining germplasm. Determinations were made for 45 morpho-agronomical traits grouped in: passport data, phenology, leaf characteristics, plant architecture, yield components, seed quality and disease reaction scored according to 1-9 scale (CIAT, 1987). Field readings were made for Anthracnose, Rust, Common Bacterial Blight, Halo Blight, Angular Leaf Spot and White Mold. Principal component analysis (PCA) was performed using all recorded data. Analysis was performed using Systat Ver. 5.02 and results were ploted in Sigma Plot Ver. 8.

RESULTS AND DISCUSSION. Seed commercial classes with higher accession number was cream type known as "Bayo" (28) and black (24), while pink cream stripped "Flor de Junio" (2) and cream "Canario" type (4) showed the lowest accession number. Superiority observed for Bayo and black seeded cultivars are due to those commercial classes have been planted in larger areas of the Mexican Highlands and in the tropics. Natural diversity present in each commercial class influenced the number of cultivars included in core collection. PCA showed low values for PC1 (12.7 %) and PC2 (12.5 %) due to a high variation detected in the cultivar subset selected in the common bean germplasm bank. Three main groups were observed (Figure 1): I. Nueva Granada race with determinate bush (Type I) cultivars; II. Mesoamerican black seeded cultivars and III. Highlands diversity complex with cultivars included in Jalisco and Durango races. Group I. included cream types known as "Canarios" and Cranberry (Cacahuate) cultivars with different color patterns such as red and black. Group II included mainly black (opaque and shiny) seeded cultivars with sub-groups for Type II (Mesoamérica) and Type III (Jalisco) growth habits. Group II also included recombinant cultivars with different grain color such as "Jaspeado" or "Rebosero" (cream

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or gray background and gray, red or black mottled) and black striped cultivars similar to Ojo de Cabra type. Some Bayo cultivars were included in group II, which showed some traits similar to black seeded germplasm such as purple flowers. Diversity complex was observed in group III which included several commercial classes sown in Mexican Highlands. Highest diversity by commercial class was observed in Bayo (Cream), Morado de Agua (Purple), Garbancillo (Yellow) and Pinto (Cream with brown and black spots). Some Cranberry Type IV cultivars were also included in group III. Recombinant cultivars with intermediate traits were observed between groups. Similar results were observed using bred germplasm since many bred cultivars were obtained using massal selection in landraces. In spite of the apparent over-representation observed in some commercial classes, due to similarities in grain color, differences in other morpho-agronomical traits were detected. Diversity observed in determinate Type I cultivars was low due to its introducion in México (Nueva Granada race), while huge accession number and diversity were observed in commercial classes related to Mesoamérica gene pool (Mesoamérica, Durango and Jalisco races). Results helped to ensure that actual common bean core collection are truly representative of the many diverse environments in which beans evolved and are grown. Results need to be corroborated using molecular markers to ensure representativeness of common bean genetic diversity included in the core collection. Morpho-agronomical and molecular characterization will be used in broadening the knowledge and exploitation of common bean genetic diversity to obtain increments in disease resistance and seed yield.

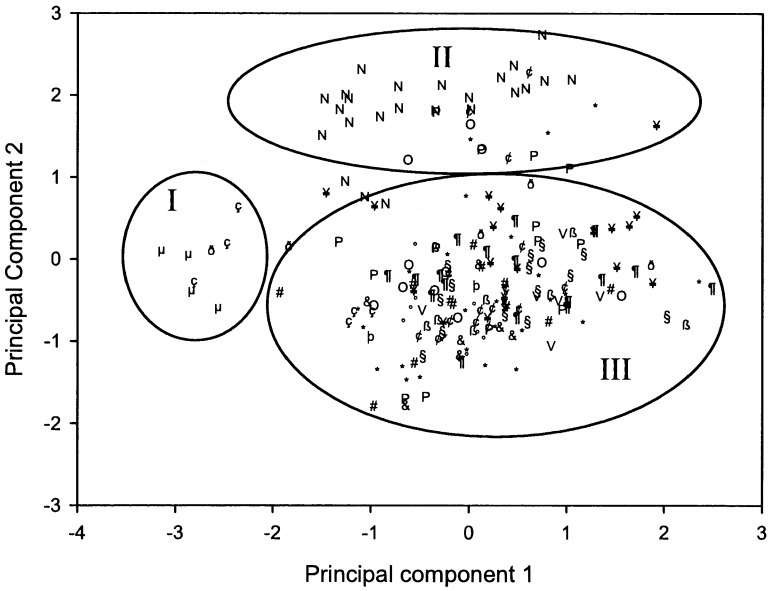

Figure 1. Principal component analysis for Mexican common bean core collection. I. Nueva Granada race, II. Black seeded and recombinant cultivars and III. Highlands diversity complex (Jalisco and Durango races). &= White; #= Yellow; *= Bayo; °= Cream-Gray; ç= Cranberry; §= Brown; µ= Canario; þ= Flor de Junio; ß= Flor de Mayo; ¶= Garbancillo; ¢= Jaspeado; ¥= Purple; N= Black; O= Ojo de Cabra; P= Pinto; ð= Red and V= Vaquita.

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